REMARKS

Claims 1-13 and 15-24 will be pending upon entry of the present amendment. Claims 13, 15, and 17 are amended and claim 14 is cancelled.

Applicant thanks the Examiner for indicating the allowability of claims 3, 5, 8-12, 15-21, and 24.

Claims 13, 14, 22, and 23 have been rejected under 35 USC §102(b) as being anticipated by Young (U.S. 5,506,487). Claims 1, 2, 4, 6, and 7 have been rejected under 35 USC §103(a) as being unpatentable over Young in view of Lee (5,469,112).

Claim 13 has been amended to include the limitation of dependent claim 14, which is cancelled. Amended claim 13 recites, in part, "repeating the determining and incrementing steps *at a selected frequency* during a *selected time period*." Young fails to teach at least this limitation of claim 13.

Young incorporates a commutation counter (302) that is configured to count down from a preloaded value to zero before a zero crossing of the BEMF, to remain substantially at zero until after the zero crossing, and to count up to a preset value, at which time it generates a commutation signal. This process is described in the specification (see, for example, column 11, lines 37-41 and column 12, lines 24-30) and well illustrated in Figure 4B, which shows the value of the counter at "UP/DN BEMF COUNT." At the same time, a commutation interval timer (308) times the commutation interval from one commutation signal to the next. The timer value is shown in Figure 4B as a sawtooth signal "COMMUTATE INTERVAL TIMER" (see also column 10, lines 61-64). A speed regulation circuit (144) then uses the timed value of successive commutation intervals to control the speed of the motor (see column 8, line 64 to column 9, line 10). The important point to recognize is that the commutation counter does not operate during a selected time period. Instead, the value of the counter is selected (the "preset value") and the operation of the commutation interval timer is controlled by the counter.

Additionally, it may be seen, with reference to Figure 4B, that the frequency at which Young's commutation counter increments is unpredictable while the counter is at zero. This is because the counter is configured to count down to zero, but no further, and so while the BEMF is negative, it holds at zero, and only increments when noise causes an occasional

positive spike (see previously cited text, and also column 10, lines 34-43). It only resumes incrementing at a fixed frequency when the count no longer drops to zero, as it rises toward the preset value. The time period during which it increments at its selected frequency is determined at least in part by the noise in the back EMF voltage, and so cannot be said to be a selected time period. Accordingly, Young fails to anticipate each limitation of claim 13, which is therefore allowable thereover. Dependent claims 15-20 are also allowable over Young as depending from an allowable base claim.

Claim 22 recites, in part, "an enable module configured to enable the counter module during a selected time period." Though claim 22 differs in scope from claim 13, it is allowable over young for many of the reasons outlined above. In particular, Young's commutation counter is clearly disabled and unable to increment while the BEMF voltage remains negative, and the period during which it is enabled is delimited by the point at which the BEMF voltage rises above the noise value at one end, and by the point at which the counter reaches the preset value at the other end. Clearly, this period is not "selected," as recited in claim 22. Accordingly, claim 22, together with claims 23 and 24, is allowable over Young.

With respect to claim 23, which recites "a position detector module configured to determine a true position of a rotor of the motor based upon a count of the counter module at an end of the selected time period," Young also fails to anticipate this limitation. As has been previously explained, Young's commutation counter increments to a preset value, at which time it generates a commutation signal. Since the preset value is established prior to the beginning of the counting (column 12, lines 54 and 55), the count of the commutation counter is already known, and so when the counter arrives at the preset value and stops counting, there is no information to be extracted from the count of the counter. Instead, Young's method extracts information from the timing of the counting. In other words, the counting is selected, while the time period is not. Clearly, claim 23 is allowable on its own merits, apart from its allowability as depending from an allowable base claim.

Turning now to claim 1, this claim recites, "detecting a polarity signal of a back electromotive force from a winding of the motor using a detection circuit; and using a bi-directional counter to count a difference in residence time of logic states '0' and '1' at an output

of said detection circuitry." Young fails to teach or suggest all the limitations of claim 1, and Lee cannot remedy the deficiencies of Young. As the Examiner has acknowledged, Young does not teach using a bi-directional counter to count a difference in residence time of logic states '0' and '1' at an output of said detection circuitry.

For its part, Lee's principles of operation are radically different, and do not teach or suggest this limitation. Lee is directed to a demodulator circuit for demodulating multi-level digital signals. Lee does employ a zero crossing detector. However, the exact position of the zero crossing is never in doubt, and there is no disclosure of the circuit employed for this purpose. Instead, Lee is concerned with determining the *direction* of the phase shift. Lee states, at column 3, beginning at line 27:

> A positive phase axis-crossing means that the phase trajectory crosses i or q axis in a positive direction (*counter-clockwise*). Similarly, a negative phase axis-crossing means that the phase trajectory crosses i or q axis in a negative direction (*clockwise*). The zero-crossing detector 120 sets its output high if the phase trajectory crosses i or q axis in a positive direction. A low output is produced when the phase trajectory crosses i or q axes in the negative direction.

Lee proceeds to explain that the counter is incremented when a positive phase rotation (counter-clockwise) is detected, while a negative phase rotation decrements the counter. It may be seen that Lee is not concerned with the polarity of a signal but rather with the direction of phase rotation, i.e., clockwise or counterclockwise.

The process is clearly explained in the paragraph beginning at line 46 of column 3, with reference to Figures 3 and 4. Lee's method does not distinguish between positive and negative polarities, and does not provide any information on detecting zero crossings.

It will be recognized that Lee's rate of counting depends upon the rate of phase change, and only increments or decrements the counter when an axis is crossed, there is no way of determining residence time at any polarity. For this reason, as well, Lee cannot provide a teaching or suggestion to "count a difference in residence time." Clearly, Lee fails to compensate for Young's deficiencies.

Finally, there is no motivation in either Lee or Young to combine the references, and so such a combination is improper. Young is directed to controlling a compressor motor, while Lee is directed to signal demodulation. Clearly, these are not even remotely related fields

of technology. Lee offers nothing to improve more accurate tracking of back electromotive force, while Young has no interest in demodulation. The direction of phase shift in Young is known, and so there is no need for the solutions provided by Lee. Lee assumes that the zero crossing is detectable, and does not provide further insight in this regard, Lee is not concerned with commutation windings, and so does not provide any teaching that will improve the energization timing of Young's motor windings. For all these reasons, there is no motivation to combine Lee with Young.

Claim 1 is clearly allowable over Young and Lee, either individually or in combination. Dependent claims 2-12 are also therefore allowable.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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